EFFECT OF SOME INTRINSIC FACTORS ON GESTATION LENGTH, BIRTH WEIGHT AND MILK YIELD OF FRIESIAN X BUNAJI COWS

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ABSTRACT

This study was conducted to determine the effect of sire of dam, parity, dam body condition score (BCS) and sex of calf on birth weight (BWT), gestation length (GL) and milk yield (MY) of Friesian x Bunaji dairy cows. Results showed that sire had significant (P<0.05) effect on gestation length (GL), birth weight (BWT) and milk yield (MY) of dam. However, parity of dam had no significant (P>0.05) effect on GL and BWT of calves, but had significant (P<0.05) effect on MY with a trend that showed an increase in milk yield with parity until the maximum yield was attained at 4th parity and declined thereafter. The dams body condition score (BCS) had significant effect on GL, BWT and MY. Dams with higher BCS (> 3.5) had longer GL (280.27days) and higher BWT (30.50kg), while those with moderate BCS (ranged 2.5 – 3.5) had higher MY(1995.25kg) and moderate BWT (26.33kg). Findings in this study showed that the maximum parity in which optimum performance of this crosses could be attain is the 4th parity, beyond which the production capacity may declined. Also, the dam BCS required for optimum BWT and MY is between 2.5 and 3.5 point.

INTRODUCTION

The introduction of Friesian sire in Nigeria has produced a stabilized crossbred Friesian x Bunaji cows whose dairy performance has been adjudged to be higher than the pure Bunaji. (Oni et al., 2001). The First generation cross bred generally has been reported (Richard, 1993) to yield twice that of the indigenous pure breeds. The evaluation of factors that could influence the gestation length (GL), birth weight (BWT) and milk yield (MY) of this crossbred cows is very important in formulation of breeding programme aimed at improving their dairy performance. Therefore, the objective of this study was to determine the effect of some factors on birth weight, gestation length and milk yield of Friesian x Bunaji dairy cows.

MATERIALS AND METHODS

Experimental site:

The study was conducted on the dairy herd of National Animal Production Research Institute (NAPRI) Shika, Nigeria, located between latitude 11° and 12°N at an altitude of 640 m above sea level, and lies within the Northern Guinea Savannah Zone (Oni *et al.*, 2001).

Animals and managements:

Data for this study were collected from 13 primiparous and 47 multiparous (F_1) Friesian x Bunaji cows. The cows were raised on both natural and paddock–sown pasture, while hay and/or silage supplemented with concentrate of undelinted cotton seed cake, were offered daily during milking. Cows were milked twice daily (morning and evening) and milk yield was recorded on daily basis. The body condition score was taken monthly on a scale 1 to 5 by visual appraisal. Calves were weight immediately after calving.

Data analysis

Data collected were analyzed by Least Squares technique of General Linear Model (GLM) procedure of SAS, (2000). The model used was

$$Y_{ijklm} = \mu + S_i + P_j + CS_k + X_l + e_{ijklm}$$

Where: μ =overall mean; S_i= effect of i^{th} sire; P_j= effect of j^{th} parity; CS_k= effect of j^{th} condition score; X_l= effect of l^{th} sex of calf; e_{ijklm} = random error

RESULTS AND DISCUSSION

The effects of sire and Parity on gestation length (GL), birth weight (BWT) and milk yield (MY) is shown in (Table 1). Gestation length (GL), BWT and MY varied significantly (P<0.05) with sire of dam. The significant effect of sire on GL, BWT and MY in this study agreed with the earlier findings of Reynold *et al.*(1990) Ehoche *et al.*(1992) and Gwaza *et al.*(2007), respectively. This observation underscored the importance of using proven sire in the dairy herd to ensure optimum performance. Parity of dam had no significant (P>0.05) effect on GL and BWT of calves, but had significant (P<0.05) effect on the milk yield of the dam. The significant effect of parity on milk yield characteristics in this study corroborate the earlier findings of other authors (Licitra *et al.*, 1990; Kahi *et al.*,2000; Musa *et al.*,2005; Akpa *et al.*,2006; M'hamdi *et al.*,2012;

Alphonsus et al., 2012). This suggested that parity is an important factor that should be considered in dairy animal selection. In this study, there was a trend of increasing milk yield characteritics as parity increased until the maximum yield was attained at 4th parity and then declined thereafter. This had also been reported by Malau-Aduli *et al.*(1996) and Akpa *et al.*(2006) in the same Friesian-Bunaji cross bred cows. Other reports from literatures on other breeds supported this results; Bajwa *et al.*,2004 and Sarkar *et al.*(2006) reported increase in milk yield with parity, with the maximum milk yield around 4th and 5th parities. Also, Javed (1999) reported increase in MY towards the 5th parity and declined thereafter to the 12th parity. The most likely reason for this observations is that when most heifers calved for the first time, they are still growing; their physiological and anatomical structure for milk secretion are not yet fully developed. With an increase in age, there is a corresponding linear relationship with yield until a certain age is reached, beyond which an inverse relationship takes over (Malau-Aduli *et al.*,1996). This stage as shown by the results of this study and other earlier reports (Malau-Aduli *et al.*,1996; Akpa *et al.*,2006) in the same Friesian-Bunaji crossbred in the National Animal Production Research Institute (NAPRI) is arround the 4th and 5th parities. This suggests that the maximum parity in which this crosses should be kept in the herd before been culled is the 5th parity, beyond which the production capacity may declined. The increase in milk yield characteristics with parity order could also be attributed to the effect of cows age on the development and regeneration of secretory tissues of the mammary glands. In the same vein, the low MY of the first parity cows is logical in the sense that the first parity cows are still growing and nutrients are therefore partitioned for body growth and development, as well as milk production. The dams body condition score (BCS) and sex of calf had significant effect on GL, BWT and MY of the dam. Dams with higher BCS (> 3.5) had longer GL (280.27days) and higher BWT (30.50kg), while those with moderate BCS (ranged 2.5 – 3.5) had higher MY(1995.25kg) and moderate BWT (26.33kg). This suggest that the BCS required for optimum BWT and MY is between 2.5 and 3.5. The GL, BWT and MY varied significantly ($P<0.05$) with sex of calf, with the male bearing cows having longer GL (279.60days) , higher BWT (28.30kg) and MY (1950.11kg) than the female bearing cows. The male calves were carried 5 days longer than female calves and were about 4kg heavier than there female counterpart at birth. The observed superiority of male calves over their female counterpart at birth confirmed previous findings (Norman *et al.*, 2009; Alphonsus *et al.*, 2010).

Conclusion:

Findings in this study showed that the maximum parity in which optimum performance of this crossbred cows could be attain is the 4th parity, beyond which the production capacity may declined. Also, the dam BCS required for optimum BWT of calf and MY is between 2.5 and 3.5.point.

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Table 1: Least square means and standard error (Mean ± SE) for the effect of sire and parity on gestation length, birth weight and milk yield

Sire	Gestation length	Birth weight	Total milk yield
	Mean ± SE	Mean ± SE	Mean ± SE
1	281.31± 3.83^{b}	29.42± 2.96^{a}	2014.37± 285.62^{a}
2	277.96± 2.59^{c}	27.51± 2.00^{b}	1955.46± 121.36^{ab}
3	289.84± 4.33^{a}	29.42± 4.11^{a}	1844.40 ± 402.52^{ab}
4	281.53± 4.31^{b}	26.79± 3.33^{b}	1611.38± 189.75^{b}
Parity	Ns	Ns	*
1	281.57 ± 57	24.15± 3.45	1758.57±236.21^{bc}
2	283.69± 3.25	26.63± 2.83	1760.81± 192.87^{bc}
3	284.56± 3.85	27.54± 3.03	1990.16± 192.87^{b}
4	285.49± 4.41	27.26±2.57	2049.37± 192.88^{a}
5	282.50± 4.34	26.24± 3.14	1635.40 ± 289.31^{c}

Table 2: Least square means and standard error (Mean ± SE) for the effect of dams body condition score and sex of calf on gestation length, birth weight and milk yield

Body condition score	Gestation length	Birth weight	Total milk yield
	Mean ± SE	Mean ± SE	Mean ± SE
Low (< 2.5)	282.76 ± 4.40^{b}	23.50± 3.52^{c}	1869.34± 102.82^{ab}
Moderate (2.5- 3.5)	280.08 ± 1.62^{b}	26.33± 1.37^{b}	1995.25± 411.27^{a}
High (>3.5)	287.27 ± 5.72^{a}	30.50± 5.23^{c}	1819.83± 335.80^{b}
Sex of calf	*	*	*
Male	287.60 ± 3.01^{a}	28.30± 2.39^{a}	1950.11± 137.49^{a}
Female	279.14 ± 3.16^{b}	24.42± 2.50^{b}	1803.47± 133.62^{b}